WHAT IS CLAIMED IS:

1. A process for producing para-diisopropylbenzene from cumene and propylene, said process comprising the steps of (1) introducing a feed stream into an alkylation zone wherein said feed stream is comprised of cumene and propylene, and wherein said alkylation zone contains an alkylation catalyst; (2) allowing the cumene and propylene in the feed stream to react together to produce a first mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (3) fractionally distilling the mixture of para-diisopropylbenzene and meta-diisopropylbenzene in a fractional distillation step to separate the meta-diisopropylbenzene from the para-diisopropylbenzene; (4) isomerizing the meta-diisopropylbenzene in the presence of a transalkylation catalyst to produce a second mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (5) recycling the second mixture of para-diisopropylbenzene and meta-diisopropylbenzene recovered from the transalkylation step to the fractional distillation step; and (6) recovering the para-diisopropylbenzene that was separated from the meta-diisopropylbenzene by the fractional distillation step.

2. A process for producing para-diisopropylbenzene as specified in claim 1 wherein said process is void of benzene.

3. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the isomerization step is conducted at a temperature which is within the range of about 350°F to about 460°F.

4. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the alkylation step is conducted at a temperature that is within the range of about 300°F to about 400°F.

5. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the transalkylation catalyst is an acidic solid oxide catalyst.

6. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the transalkylation catalyst is a zeolite catalyst.

7. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the transalkylation catalyst is zeolite ZSM-12.

8. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the alkylation catalyst is an acidic solid oxide catalyst.

9. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the alkylation catalyst is a zeolite catalyst.

10. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the alkylation catalyst is zeolite ZSM-12.

11. A process for producing para-diisopropylbenzene as specified in claim 1 wherein the isomerization step is conducted at a temperature which is within the range of about 365°F to about 430°F.

12. A process for producing para-diisopropylbenzene as specified in claim 11 wherein the alkylation step is conducted at a temperature that is within the range of about 340°F to about 375°F.

13. A process for producing para-diisopropylbenzene as specified in claim 12 wherein the transalkylation catalyst is a zeolite catalyst.

14. A process for producing para-diisopropylbenzene as specified in claim 13 wherein the alkylation catalyst is a zeolite catalyst.

15. A process for producing para-diisopropylbenzene as specified in claim 14 wherein the isomerization step is conducted at a temperature which is within the range of about 380°F to about 415°F.

16. A process for producing para-diisopropylbenzene as specified in claim 11 wherein the alkylation step is conducted at a temperature which is within the range of

about 345°F to about 360°F.

17. A process for producing para-diisopropylbenzene as specified in claim 16 wherein the transalkylation catalyst is zeolite ZSM-12.

18. A process for producing para-diisopropylbenzene as specified in claim 17 wherein the alkylation catalyst is zeolite ZSM-12.

19. A process as specified in claim 2 which further comprises mixing the meta-diisopropylbenzene recovered from the fractional distillation with additional cumene to produce a meta-diisopropylbenzene/cumene feed stream; and isomerizing the meta-diisopropylbenzene in the meta-diisopropylbenzene/cumene feed stream in the presence of the transalkylation catalyst to produce the second mixture of para-diisopropylbenzene and meta-diisopropylbenzene.

20. A process for producing para-diisopropylbenzene as specified in claim 19 wherein the ratio of cumene to m-diisopropylbenzene in the transalkylation step is within the range of about 0.0.1:1 to about 10:1.

21. A process for producing para-diisopropylbenzene as specified in claim 19 wherein the ratio of cumene to m-diisopropylbenzene in the transalkylation step is within the range of about 0.25:1 to about 6:1.

22. A process for producing para-diisopropylbenzene as specified in claim 19 wherein the ratio of cumene to m-diisopropylbenzene in the transalkylation step is within the range of about 0.25:1 to about 6:1.

23. A process for producing para-diisopropylbenzene from cumene and propylene, said process comprising the steps of (1) introducing a feed stream into an alkylation zone wherein said feed stream is comprised of cumene and propylene, and wherein said alkylation zone contains an alkylation catalyst; (2) allowing the cumene and propylene in the feed stream to react together to produce a mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (3) fractionally distilling the mixture

of para-diisopropylbenzene and meta-diisopropylbenzene in a first fractional distillation step to separate the meta-diisopropylbenzene from the para-diisopropylbenzene; (4) isomerizing the meta-diisopropylbenzene in the presence of a transalkylation catalyst to produce a second mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (5) fractionally distilling the second mixture of para-diisopropylbenzene and meta-diisopropylbenzene produced by the transalkylation step in a second fractional distillation step to separate the para-diisopropylbenzene from the meta-diisopropylbenzene; (6) recycling the meta-diisopropylbenzene recovered from the second fractional distillation to step 4; and (7) recovering the para-diisopropylbenzene that was separated from the meta-diisopropylbenzene by the first fractional distillation step and the second fractional distillation step.

24. A process for producing meta-diisopropylbenzene from cumene and propylene, said process comprising the steps of (1) introducing a feed stream into an alkylation zone wherein said feed stream is comprised of cumene and propylene, and wherein said alkylation zone contains an alkylation catalyst; (2) allowing the cumene and propylene in the feed stream to react together to produce a first mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (3) fractionally distilling the mixture of para-diisopropylbenzene and meta-diisopropylbenzene in a fractional distillation step to separate the para-diisopropylbenzene from the meta-diisopropylbenzene; (4) isomerizing the para-diisopropylbenzene in the presence of a transalkylation catalyst to produce a second mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (5) recycling the second mixture of para-diisopropylbenzene and meta-diisopropylbenzene recovered from the isomerization step to the fractional distillation step; and (6) recovering the meta-diisopropylbenzene that was separated from the para-diisopropylbenzene by the fractional distillation step.

25. A process for producing meta-diisopropylbenzene from cumene and propylene, said process comprising the steps of (1) introducing a feed stream into an alkylation zone wherein said feed stream is comprised of cumene and propylene, and wherein said alkylation zone contains an alkylation catalyst; (2) allowing the cumene and propylene in the feed stream to react together to produce a mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (3) fractionally distilling the mixture

of para-diisopropylbenzene and meta-diisopropylbenzene in a first fractional distillation step to separate the para-diisopropylbenzene from the meta-diisopropylbenzene; (4) isomerizing the para-diisopropylbenzene in the presence of a transalkylation catalyst to produce a second mixture of para-diisopropylbenzene and meta-diisopropylbenzene; (5) fractionally distilling the second mixture of para-diisopropylbenzene and meta-diisopropylbenzene produced by the transalkylation step in a second fractional distillation step to separate the para-diisopropylbenzene from the meta-diisopropylbenzene; (6) recycling the para-diisopropylbenzene recovered from the second fractional distillation to step 4; and (7) recovering the meta-diisopropylbenzene that was separated from the para-diisopropylbenzene by the first fractional distillation step and the second fractional distillation step.